

REMARKS

Claims 14-26 are pending in the application.

Specification

The wrong reference number on page 6 has been corrected.

Rejection under 35 U.S.C. 102

Claims 1-4 stand rejected under 35 U.S.C. 102(b) as being anticipated by *EP 0 836 923*.

The present invention relates to a tool for a multi-component injection molding process for producing plastic toothbrush bodies. The object of the invention is to provide an improved tool for a multi-component injection molding process for preventing the formation of burrs in the area of the head of the injection-molded toothbrush body.

According to the present invention, this is achieved by:

- a) two tool halves (1, 1') forming hollow mold spaces (2) and configured to move apart into an open position and to move together into a closed position;
- b) the hollow mold spaces (2) comprising first cavities for injection molding first components of the toothbrush body (4) and second cavities for forming second components of the toothbrush body (4), wherein the first cavities are delimited exclusively by the two tool halves (1, 1');
- c) a transfer device (6) integrated into a first one of the two tool halves (1) and immersible into the first tool half (1), wherein the transfer device (6) is configured to transfer injection-molded blanks (3) formed in the first cavities into the second cavities for injection molding the second components and wherein the transfer device (6) in the closed position of the two tool halves (1, 1') is located outside of the first cavities;
- d) the transfer device (6) configured to move, after injection molding of the first components, into the first cavities of the injection-molded blanks (3), to pick up the injection-molded blanks (3), and subsequently transport the injection-molded blanks into the second cavities for injection-molding the second components.

The first component is thus injection-molded in a first cavity that is formed **exclusively by the two tool halves**. The transfer device in the closed state of the tool is

located outside of the area where the first component is injection-molded (outside of the first cavity). The transfer device, after injection-molding of the first component is complete, is moved into the area of the injection-molded blank, picks up the injection-molded blank, and transports it subsequently into the second cavity of the mold for injection-molding the second component. Accordingly, the principle of the invention is that the first component is injection-molded in a cavity of the mold that is delimited exclusively by the two tool halves 1, 1'. The transfer device 6 does not form a part of the delimiting walls of the first cavity of the hollow mold space 2. This prevents that in particular in the area of the head of the toothbrush bodies a circumferential burr is formed.

According to feature d), for injection molding the second component, the transfer device 6 picks up the injection-molded blank 3 (the first component) by being moved into the area of the injection-molded blank 3 and picking up the blank in a suitable way. The picked-up blank 3 is then transported into the second cavity of the hollow space 2 of the mold for injection-molding the second component. The transfer device 6, in order to receive the injection-molded blank 3, is formed as a cavity.

The cited prior art reference shows a tool for multi-component injection molding of plastic toothbrush bodies. The tool is comprised of molds 4, 6; 8, 10 forming therebetween the hollow spaces or cavities of the mold. Figs. 1 and 2 show that in the lower half the first component is molded and in the upper half the second component (dashed lines) is molded, respectively.

The moveable tool parts 6, 10 have a transfer part 15 connected thereto. The transfer part 15 is comprised of a rotatable frame 31 having insertion parts 16, 17 attached thereto. The insertion parts 16, 17 have recesses 32 and are part of the mold cavity 23, 24 when the mold is closed. (See col. 3, lines 14-19.)

Thus, the part 16 is integrated into the mold 4, 6 and contributes to the shaping of the injection-molded blank (first component). For molding the second component, the blank shaped in the mold 4, 6, 16 can be moved by the transfer part 15 into the corresponding mold 8, 10. This transfer device 15 is rotatable about the axis of rotation 33 supported in the mold part 6, 10. This transfer part 15 operates as follows. For the injection molding process, the transfer part 15 is immersed with its parts 16, 17 into the corresponding

- 4 -

12/10/03: Amd for Ser. No. 09/995,408 - Inventor(s): Klaus Bühler - Filing Date: 11/27/2001

recesses 18, 19 in the mold parts 4, 8. After closing the mold, i.e., moving the mold parts 6, 10 into the closed position, the first component is injection molded in the lower mold 4, 6, 16 (Figs. 1 and 2 at the bottom). The part 16 forms a part of the shaping cavity of the lower mold.

After injection molding the first component, the moveable parts 6, 10 are moved away and, subsequently, the transfer part 15 is laterally moved in the direction toward the parts 6, 10 and then rotated by 180 degrees about the axis 33 with drive means 21 so that the blanks reach the mold cavity defined by parts 8, 10, as illustrated in Fig. 1. The lower blanks are thus rotated into the upper position. During the movement into the upper position, the blanks are secured by the parts 16. After closing the mold again, the second component can be injection molded (the rotated part 16 is now part of the upper mold cavity 8, 10). After injection molding the second component, the toothbrush bodies are then ejected from the mold.

Even though in this prior art reference in col. 9, lines 27-33, it is mentioned that also a linear movement or a combined linear and rotational movement can take place, there is no practical embodiment disclosed. It is also not conceivable how, based on the provided disclosure, such a movement could function practically.

None of the features b) through d) are shown in the cited prior art reference. The feature b) defines that for injection molding the first component the first cavities of the mold are formed **exclusively by the two tool halves 1,1'**. According to the claimed invention, the transfer device 6 therefore cannot be part of the delimiting walls of the cavities. This also means that the transfer device 6 is not located within the area of the cavity for injection molding the first component.

In the cited prior art, the part 16 of the transfer part 15 is positioned so as to form a part of the wall delimiting the hollow space for injection molding the first component and forms part of the mold cavity so that, after completion of molding, the blank is still attached to the mold part 16. Only in this way is it possible that the injection-molded blank can be rotated by the transfer part 15 by 180 degrees into the second molding position.

As a consequence of this arrangement, the feature c) is also not disclosed in the cited prior art reference. According to feature c), the transfer device 6 during injection

molding of the first component is located outside of the area for injection molding the first component. In contrast to this, in the cited prior art reference, the part 16 of the transfer part 15 is arranged in the area for injection molding the first component (forms part of the mold cavity of the first component).

The transfer part 15 with its two parts 16, 17 is always in the area of the injection-molded blank. The principle according to the feature d), i.e., the transfer device 6 after injection molding of the first component is moved toward the blank 3, receives the blank 3, and transports the blank 3 into the second cavity is not realized in the cited prior art reference. A pickup process like the one disclosed in the present invention does not take place. The blank is constantly in contact with the transfer device 15, i.e., the two parts 16, 17 of the transfer part 15 secure the blanks in the molds, respectively. This securing action of the pieces 16, 17 is described in col. 5, line 38, to col. 6, line 2.

As pointed out above, the features b) through d) are not shown in the cited prior art reference and, therefore, the claims of the instant application are not anticipated by the prior art reference.

Moreover, the features b) through d) are also not obvious because a **movable transfer device that moves into the cavities and picks up the blanks** is not realized in the cited prior art reference since the transfer device is part of the mold cavities and the blanks are already secured to the transfer device when being molded. Also, the feature b) according to which the injection mold cavity is formed **exclusively by the two tool halves** is not disclosed or suggested in the cited prior art reference.

ALLOWABLE SUBJECT MATTER

Claims 16, 20, 22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicant appreciates the examiner's suggestion of allowable subject matter but is of the opinion that the current claims clearly define over the cited prior art reference in view of the arguments presented above.

CONCLUSION

In view of the foregoing, it is submitted that this application is now in condition for

- 6 -

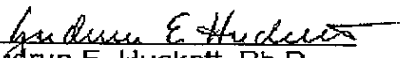
12/10/03: Amd for Ser. No. 09/995,408 - Inventor(s): Klaus Bühler - Filing Date: 11/27/2001

allowance and such allowance is respectfully solicited.

Should the Examiner have any further objections or suggestions, the undersigned would appreciate a phone call or e-mail from the examiner to discuss appropriate amendments to place the application into condition for allowance.

Authorization is herewith given to charge any fees or any shortages in any fees required during prosecution of this application and not paid by other means to Patent and Trademark Office deposit account 50-1199.

Respectfully submitted on December 10, 2003,


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- 7 -

12/10/03: Amd for Ser. No. 09/995,408 - Inventor(s): Klaus Bühler - Filing Date: 11/27/2001